

Application No.: 10/611,931

Docket No.: YOR920020368US1
20140-00301-US

Listing of Claims

The following listing of claims replaces the claims in the case.

Please cancel claims 1, 27-37 and 40-42 with prejudice to their reentry at some later date such as in a continuing application.

1-3. (Canceled)

4. (Currently Amended) The method of claim 1 ± 26 where the selective Cu etching is followed by blanket deposition of one or more barrier or dielectric materials.

5. (Original) The method of claim 4 where said blanket deposition is followed by planarization for removing liner from the horizontal surfaces of the dielectric.

6. (Currently Amended) The method of claim 1 ± 26 where the selective Cu etching is followed by the selective deposition on the Cu of one or more materials by electrolytic plating.

7. (Original) The method of claim 6 where said materials are selected from the group of Co, CoP, CoWP, CoMoP, Ni, NiP, NiWP, NiMoP, NiW, NiMo, CoMo, NiFe, CoFe, NiFeP, CoFeP, NiB, CoB, NiFeB, CoFeB, NiCo, NiCoP, NiCoB, NiWB, NiMoB, CoWB, CoMoB, CoV, NiV, CoFeV, NiFeV, NiCoV, NiCoFeV, NiCo, Ru, Re, Pt, Pd, Rh, Os, NiPd, CoPd, Pb, Sn, Sb, and In.

8. (Original) The method of claim 7 wherein said electrolytic plating is followed by planarization for removing liner from the horizontal surfaces of the dielectric.

9-13. (Canceled)

14. (Original) The method of claim 6 wherein said selective deposition by electrolytic plating is followed by the blanket deposition of a metal or alloy.

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15. (Original) The method of claim 14 which further comprises planarization following said blanket deposition.

16. (Currently Amended) ~~The method of claim 1~~ A method for fabricating a patterned copper structure which comprises providing a dielectric material on a substrate, providing at least one trench/via in the dielectric material; providing a liner on the bottom and sidewalls of the at least one trench/via and on horizontal surfaces of the dielectric material in the vicinity of the at least one trench/via;

depositing copper in the at least one trench/via on the liner; and selectively etching the copper by electroetching to recess the copper with respect to the top surfaces of the dielectric;
and then selectively depositing on the Cu, one or more materials by electrolytic plating or by electroless plating and further ~~comprises~~ comprising removing said liner from horizontal surfaces on said dielectric followed by selectively seeding the copper and then plating a capping layer on the seeding by electroless plating.

17. (Original) The method of claim 16 wherein said electroless plating is followed by blanket deposition of a metal or alloy.

18. (Original) The method of claim 17 wherein said blanket deposition is followed by planarization.

19. (Canceled)

20. (Previously Presented) The method of claim 24 where said materials are selected from the group of Co, CoP, CoWP, CoMoP, Ni, NiP, NiWP, NiMoP, NiW, NiMo, CoMo, NiFe, CoFe, NiFeP, CoFeP, NiB, CoB, NiFeB, CoFeB, NiCo, NiCoP, NiCoB, NiWB, NiMoB, CoWB, CoMoB, CoV, NiV, CoFeV, NiFeV, NiCoV, NiCoFeV, NiCo, Ru, Re, Pt, Pd, Rh, Os, NiPd, CoPd, Pb, Sn, Sb, and In.

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21. (Previously Presented) The method of claim 24 which further comprises planarizing after the electroplating for removing liner from the horizontal surfaces of the dielectric.
22. (Previously Presented) The method of claim 24 wherein said selective deposition by electrolytic plating is followed by the blanket deposition of a metal or alloy.
23. (Original) The method of claim 22 which further comprises planarization of following said blanket deposition.
24. (Previously Presented) A method for fabricating a patterned copper structure which comprises providing a dielectric material on a substrate;
providing a liner on the bottom and sidewalls of the at least one trench/via and on horizontal surfaces of the dielectric material in the vicinity of the at least one trench/via;
depositing copper in the at least one trench/via on the liner for filling the at least one trench/via; and
selectively electroplating a metal or alloy on the copper; and
wherein the metal or alloy is applied through a nozzle for the selective electroplating and the nozzle is circular with a diameter smaller than the diameter of the substrate for reducing the overall current during the electroplating and wherein the electroplating is carried out under substantially constant current conditions.
25. (Original) The method of claim 6 wherein the metal or alloy is applied through a nozzle for the selective electroplating and the nozzle is circular with a diameter smaller than the diameter of the substrate for reducing the overall current during the electroplating and wherein the electroplating is carried out under substantially constant current conditions.
26. (Currently Amended) ~~The method of claim 1~~ A method for fabricating a patterned copper structure which comprises providing a dielectric material on a substrate, providing at least one trench/via in the dielectric material; providing a liner on the bottom and sidewalls of the at

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least one trench/via and on horizontal surfaces of the dielectric material in the vicinity of the at least one trench/via;

depositing copper in the at least one trench/via on the liner; and selectively etching the copper by electroetching to recess the copper with respect to the top surfaces of the dielectric; and then selectively depositing on the Cu, one or more materials by electrolytic plating or by electroless plating, and

wherein an etchant is applied through a nozzle for the electroetching and the nozzle is circular with a diameter smaller than the diameter of the substrate for reducing the overall current during the electroetching and wherein the electroetching is carried out under substantially constant voltage conditions.

27-37 (Canceled)

38. (Currently Amended) The product obtained by the process of claim ~~1~~ 26.

39. (Previously Presented) The product obtained by the process of claim 24.

40-42 (Canceled)

43. (Currently Amended) The method of claim ~~1~~ 26 where said materials comprise a first metal or alloy layer selected from the group consisting of Co, CoP, CoWP, CoMoP, Ni, NiP, NiWP, NiMoP, NiW, NiMo, CoMo, NiFe, CoFe, NiFeP, NiB, CoB, NiFeB, CoFeB, NiCo, NiCoP, NiCoB, NiWB, NiMoB, CoWB, CoMoB, CoV, NiV, CoFeV, NiFeV, NiCoV, NiCoFeV and NiCo; and

a second metal or alloy layer selected from the group consisting of Ru, Re, Pt, Pd, Rh, Os, NiPd, CoPd, Pb, Sn, Sb, and In.

44. (Currently Amended) The method of claim ~~1~~ 26 where said materials comprise Ru.

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45. (Previously Presented) The method of claim 6 where said materials comprise a first metal or alloy layer selected from the group consisting of Co, CoP, CoWP, CoMoP, Ni, NiP, NiWP, NiMoP, NiW, NiMo, CoMo, NiFe, CoFe, NiFeP, NiB, CoB, NiFeB, CoFeB, NiCo, NiCoP, NiCoB, NiWB, NiMoB, CoWB, CoMoB, CoV, NiV, CoFeV, NiFeV, NiCoV, NiCoFeV and NiCo; and

a second metal or alloy layer selected from the group consisting of Ru, Re, Pt, Pd, Rh, Os, NiPd, CoPd, Pb, Sn, Sb, and In.

46. (Previously Presented) The method of claim 6 where said materials comprise Ru.

47. (Previously Presented) The method of claim 24 where said materials comprise a first metal or alloy layer selected from the group consisting of Co, CoP, CoWP, CoMoP, Ni, NiP, NiWP, NiMoP, NiW, NiMo, CoMo, NiFe, CoFe, NiFeP, NiB, CoB, NiFeB, CoFeB, NiCo, NiCoP, NiCoB, NiWB, NiMoB, CoWB, CoMoB, CoV, NiV, CoFeV, NiFeV, NiCoV, NiCoFeV and NiCo; and

a second metal or alloy layer selected from the group consisting of Ru, Re, Pt, Pd, Rh, Os, NiPd, CoPd, Pb, Sn, Sb, and In.

48. (Previously Presented) The method of claim 24 where said materials comprise Ru.